NASA Facts

National Aeronautics and Space Administration

Parachute Refurbishment Facility

The Vision for Space Exploration is being made a reality at NASA's Kennedy Space Center.

Without properly functioning parachutes to straighten to vertical and slow the fall of the Solid Rocket Boosters (SRB) released after a Space Shuttle launch, the 192,000-pound SRBs would be destroyed in a rapid, uncontrolled tumble into the sea.

The chutes – including one pilot, one drogue and three main canopies per SRB – slow each SRB's fall from about 360 mph to about 50 mph.

Keeping the nine parachute flight sets in good working condition is not easy. That is the task of the Parachute Refurbishment Facility (PRF), seen below. There the parachutes are cleaned, repaired and repacked by a team of 25 United Space Alliance employees. They play an essential role in the recovery and recycling of the 150-foot SRBs, which help place the Orbiter into space.

The PRF is located several blocks south of the Operations and Checkout Facility in the Industrial Area at Kennedy Space Center.

Typically, the flight set of parachutes begins to deploy about 115 seconds after the SRBs detach from the Shuttle's external tank, about four minutes after liftoff.

First the SRB's nose cap separates from its frustum and the 11.5-foot-diameter pilot chute is released. The pilot chute extracts the 54-foot-diameter drogue chute, which inflates in three stages. The main canopies are then released from their bags in the frustum, and they also open in three stages.

After the chutes fall to the ocean, the SRB retrieval ships reel them in and store them wet until they can be returned to the PRF for cleaning, repair and repacking.

"Most people don't realize how much goes on to retrieve the SRBs and parachutes after launch because their attention focuses on the Shuttle on orbit," said Terry McGugin, manager of Parachute Operations for USA. "But it takes a dedicated team, of which the PRF is just one part, to keep the SRBs up and running."

After the chutes are returned to the PRF following launch, a hanging monorail system is used to transport each parachute into a 30,000-gallon washer and then into a huge dryer heated with 140-degree air at 13,000 cubic feet per minute.

Typically, each main canopy requires hundreds of repairs after each use. The smaller chutes and the parachute deployment bags they are packed in also require repairs.

Multiple repairs typically are needed for several reasons. The chutes are deployed so quickly that their fabric, taping and lines can be damaged by friction burning. For example, each 136-foot diameter main canopy with its 204-foot-long series of risers, bridles and lines comes out of its bag in 1.5 seconds.

Other sources of damage to the chutes are sea conditions and hot debris from the solid rocket booster nozzle extension jettison. In addition, the pilot parachute/drogue chute deployment bag assemblies are not always recovered, and when they can't be, the team manufactures replacements.

To repair the chutes, special sewing machines are used that can stitch through several inches of material. *(See photo on front.)*

After the chutes are cleaned and repaired, they must be carefully packed into their bags (below) so they will deploy correctly the next time they are used. It takes about a week to pack a main canopy, for example.

After each flight set of chutes is packed, it's typically stored from six months to a year before being used for a launch.

Other Chutes

The PRF team also cleans, repairs and repacks the Orbiter drag parachute (below) used to slow the orbiter at landing.

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